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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/509,372	09/28/2004	Takuya Sugawara	101249.55457US	3985

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EXAMINER

LEE, CHEUNG

ART UNIT PAPER NUMBER

2812

DATE MAILED: 11/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/509,372

Applicant(s)

SUGAWARA ET AL.

Examiner

Cheung Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 September 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 102005
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Notice to Applicant

1. Applicant's Preliminary Amendment filed on December 7, 2004 has been entered and made of record.

Information Disclosure Statement

2. The information disclosure statements (IDS) submitted on October 12, 2005 was filed before the first action on the merits. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Objections

3. Claim 6 is objected to because of the following informalities: in line 2, substitute "filmforming" with --film-forming--.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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4. Claims 1-5, 9-10, and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Murakawa et al. (JP Pat 2000-294550; hereinafter "Murakawa").
5. With respect to claim 1, Murakawa discloses a process for producing an electronic device material, comprising: forming a film on the surface of an electronic device substrate by using a plasma based on microwave irradiation via a plane antenna member having a plurality of slits, in the presence of a process gas comprising at least a gas containing a film-forming substance (paragraphs 23-24) and a rare gas (paragraphs 19 and 24).
6. With respect to claim 2, Murakawa discloses wherein the electronic device substrate is a semiconductor device substrate (paragraphs 1 and 24).
7. With respect to claim 3, Murakawa discloses wherein the electronic device substrate comprises Si (paragraph 24).
8. With respect to claim 4, Murakawa discloses wherein the film formation provides an insulating film formed on the substrate (paragraphs 24 and 27).
9. With respect to claim 5, Murakawa discloses wherein the film-forming substance is a film-forming substance for gate insulator (paragraphs 27 and 28) of a field-effect transistor (paragraphs 1 and 83).
10. With respect to claim 9, Murakawa discloses wherein the film-forming substance is a film-forming substance for an interlayer insulating film (paragraphs 27-28; drawing 1, item 2). The insulating layer is formed between the substrate and a gate electrode, so the examiner interprets that the insulating film is an interlayer insulating film.

11. With respect to claim 10, Murakawa discloses wherein the film-forming substance for the interlayer insulating film contains at least one atom selected from the group consisting of Si, C, O, F, N and H (paragraphs 15-16).

12. With respect to claim 12, Murakawa discloses wherein the electronic device is a semiconductor device (paragraph 1).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 6, 7, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murakawa in view of Suzuki et al. (US Pat 6497783; hereinafter "Suzuki").

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed

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in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(I)(1) and § 706.02(I)(2).

14. With respect to claim 6, Murakawa discloses wherein the film-forming substances for gate insulator, but Murakawa does not disclose expressly the film-forming substance comprises at least one substance selected from the group consisting of: SiO₂, Si₃N₄, Ta₂O₅, ZrO₂, HfO₂, Al₂O₃, La₂O₃, TiO₂, Y₂O₃, BST, Pr₂O₃, Gd₂O₃, CeO₂ and compounds of these substances.

Suzuki discloses a formation of a deposited film using microwave plasma, and as the material containing Si atoms used for formation of the thin film based on a Si compound such as Si₃N₄ or SiO₂ (col. 13, line 62-col. 14, line 46).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to select a substance from Si₃N₄ or SiO₂ for film-forming substance, as taught by Suzuki.

The motivation for doing so would have been to use a conventional substance in order to form the film based on silicon.

15. With respect to claim 7, Murakawa does not disclose expressly wherein the process gas further contains an organic source.

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Suzuki discloses several organic silanes to form a thin film using microwave plasma (col. 13, line 62-col. 14, line 46).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use organic source to form an insulating layer, as taught by Suzuki.

The motivation for doing so would have been to use a source that glassified easily using a vaporizer in order to form the film based on silicon (col. 14, lines 33-41).

16. With respect to claim 11, Murakawa does not disclose expressly wherein the plasma has an electron temperature of 2 eV or less and an electron density of $1E11/cm^3$ or more.

Suzuki discloses an electron density $10^{12}/cm^3$ or more, and an electron temperature 3 eV or less (col. 8, lines 19-30). In the case where claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. *In re Wertheim*, 541 F. 2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F. 2d 1575, 16 USPQ 2d 1934 (Fed. Cir. 1990).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use plasma electron's parameter, as taught by Suzuki.

The motivation for doing so would have been to form very thin plasma layer reducing the surface damage due to incident ions, thereby enabling high quality and high speed processing even at low temperatures (col. 8, lines 31-34).

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17. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murakawa in view of Suzuki, as applied above, and further in view of Cheung et al. (US Pat 6660656; hereinafter "Cheung").

The combined teaching of Murakawa and Suzuki does not disclose expressly wherein the carbon concentration in the insulating film is 15% or less.

Cheung discloses a silicon oxide layer which produced by plasma CVD using microwave power, and the silicon oxide layer contains high (greater than 20%) and low (less than 10%) carbon content (col. 3, line 30-col. 4, line 7). The arguments concerning overlapping range stated in claim 11 also apply.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use a certain carbon concentration in the insulating film.

The motivation for doing so would have been to provide barrier properties with certain amount of carbon content (col. 4, line 66-col. 5, line 2).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cheung Lee whose telephone number is 571-272-5977. The examiner can normally be reached on Monday through Friday from 8:30AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on 571-272-1873. The fax phone

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number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Cheung Lee

October 31, 2005



HA NGUYEN
PRIMARY EXAMINER